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and the matter would seem to be nearly exhausted; nevertheless, we shall hope to recur to M. Réboul's observations upon it in a future Number.

From all which has preceded, the readers of this *Journal* will, no doubt, observe that there is nothing in M. Réboul's communication which adds materially to our knowledge of the subject to which it refers. They will, however, we think, not be of opinion that an undue prominence has been given to it in these pages, when all the circumstances under which it has originated are taken into consideration.—Ed. *A. M.*

On some Considerations suggested by the Annual Reports of the Registrar-General, being an Inquiry into the Question as to how far the Inordinate Mortality in this Country, exhibited by those Reports, is controllable by Human Agency. (Part I.) By H. W. Porter, Esq., B.A., *Assistant Actuary to the Alliance Assurance Company, Fellow of the Institute of Actuaries and of the Statistical Society.*

[Read before the Institute the 30th January, 1860.]

UPON perusal of the Annual Reports of the Registrar-General, and of the valuable analyses by Dr. Farr that accompany them, we can scarcely fail to be struck with the alarming fatality which appears to prevail in this country from certain classes of diseases; and the inquiry naturally arises in our minds, whether we have any control over this excessive mortality: is, in fact, any proportion thereof preventable?

It is, I believe, an admitted fact, that the maladies most fatal in England are those which are classed under the general head of pulmonary complaints—of which phthisis, or consumption, contributes the greatest number of victims.

Life Assurance Companies have a great enemy to contend with in this class of diseases, as the returns of those Companies which have published their experience in respect of mortality very clearly show. Unfortunately, but few Societies have thought it desirable to make public the information they possess. It is to be regretted that this should be the case, as, by a combination of the statistics of the large number of Assurance Companies which now exist, some light could not fail to be thrown upon the subject, and the means might possibly be afforded of enabling Assurance Companies to deal with the very numerous cases in which an hereditary taint of consumption is traceable, and which are now necessarily ruthlessly rejected by them, owing to the absence, at present, of any reliable data on the subject.

It is important, however, not to lose sight of the fact, that it is not among the class of life assurers, but among the labouring community, that the intensity of mortality from consumption is to be found; and when the inordinate mortality to which we are now referring is made clearly apparent, and the matter is forced upon the attention of the public, as it is likely in the course of time to be through the medium of the Registrar's Reports, a very serious responsibility will, I apprehend, be thrown upon our legislators if they neglect to consider this question with the view to the prevention of some portion at least of the unnecessary sacrifice of human life, both from disease and accidental causes, which now takes place every year.

With reference to phthisis. This disease, Dr. Farr tells us, "is the greatest, the most constant, and the most dreadful of the diseases that afflict mankind." "It is the cause," he says, "of nearly half the deaths that happen between the ages of 15 and 35 years."

It will not, perhaps, be considered that I am asserting too much when I say that the mortality under this head is, in a great measure, produced by causes which are more or less under human control; and the classification of the occupations followed by those who fall a prey to consumption, which it will come within the province of the Registrar to make, will serve, in course of time, to point out in what direction public attention must be turned, with the view to ascertain what may be the influence of the unhealthy nature of certain occupations and of peculiar local influences upon the duration of life, and to show our legislators how it is within their power to ameliorate the unhappy condition, in respect to health and longevity, which may, by such means, be made apparent, and possibly, moreover, to place in the hands of the medical profession the means of grappling with a disease which is the great terror of this country, and which has hitherto defied all human skill, and entirely baffled medical science.

It is only by bringing these subjects before the public that we can hope to find any remedy for evils which, though they are now beginning to be known to exist around us, it seems to be no one's particular business to help to remove.

The first step towards providing a remedy for an evil, is to promulgate a knowledge of it.

Unfortunately, the Reports of the Registrar, which supply data, the reliability of which, from the elaborate system now in operation for recording facts, is undoubted, are not of a character likely to come into the hands of the general public.

It may, I imagine, be considered to fall peculiarly within the province of the Institute of Actuaries to endeavour to draw attention to matters of this nature, and to place before the public information in a shape in which alone it can be made available for general information.

The Institute, by making itself a medium for the diffusion of facts of the class under consideration, will confer a lasting benefit on the public, who will have good reason to be thankful for the establishment of a Society which, I may be allowed to say, has already, to no inconsiderable extent, assisted in the promulgation, by means of its published transactions, of much useful knowledge; and an acquaintance with facts is clearly essential before any remedy can be suggested with the view to check existing evils.

This Institute may have the proud feeling of having always promulgated its information for the use and advantage of the whole assurance body, an example that might, with advantage, be more generally followed.

Now, however valuable the voluminous returns of the Registrar's office may be, they are, in fact, practically, almost useless, unless the conclusions that may be drawn from them are made clearly apparent.

The public have to thank the indefatigable Dr. Farr for conducting them through the almost Egyptian darkness of those masses of figures, and for acting as an interpreter of the hieroglyphics of the Registrar. But, when we have deduced our inferences from the data presented to us, any deduction we may draw would prove, like the diagnosis of the physician, highly injurious unless it were strictly correct, and, like that diagnosis, however logically it might be made and however correct it might be, would be entirely useless unless we can contrive to combine with our skill in diagnosis the additional resources of the therapeutic art. Supposing, then, that Dr. Farr has most skilfully interpreted the facts recorded in the Reports, and that he has scientifically diagnosed the disease from which the country is suffering, we next have to look to the means of cure. This rests with the Legislature to effect, but, as is the case with most reforms, it is to public opinion that we must really look for taking the initiative in the matter—and how are we to influence public opinion?

It is, probably, by the diffusion of sanitary knowledge only that we are likely to gain our end; and by that means alone that we shall be enabled to introduce remedies—to force them upon our rulers, in fact—for the many preventable evils which are found to exist, and which, if even suspected before the establishment of the registration department, were certainly not positively known to be so bad as they turn out to be. I allude principally to the mortality caused by pulmonary and other cognate diseases, and by fevers and small-pox—to the excessive mortality among infants—and to deaths from accidental causes.

I will beg to point out, however, that my paper is intended to be more in the nature of an essay than of a statistical analysis of the returns of the Registrar-General, a work which, if I felt inclined to undertake, would be rendered supererogatory by the elaborate inquiry into the subject by Dr. Greenhow, in his capacity of Lecturer on Public Health at St. Thomas's Hospital.

In endeavouring to bring about any sanitary reform, we have a great amount of ignorance to contend with, and it is painful to observe how great a tendency ignorance unfortunately has to reproduce itself. This fact we see very clearly established by the statistics of marriage. The results observable from some of the returns give rise to the consideration, the Registrar tells us, "whether the ignorant have a tendency to marry the ignorant in a greater or less proportion than the learned, up to the writing point, marry the ignorant, or than those so far learned marry the learned." The Registrar, after investigating this question, comes to the conclusion that "the ignorant evidently intermarry, by choice and the force of circumstances, to a much greater extent than would be inferred from their numbers; and this," he goes on to say, "is important, as the result is, that of 24 in every 100 of the families that are now constituted every year by marriage, the children are without the advantage of having either the father or the mother able to write." Hence the reproduction of ignorance.

In any steps that may be taken by the philanthropist for the amelioration of the sanitary condition of the population, prejudices, the result of ignorance, are a great stumbling-block in the way; and, probably, until we are enabled to improve the education of the people, we shall not make great progress in improving their position in respect to health and longevity.

Our legislators are, perhaps, not free from blame in allowing the present state of things to continue; and I fear it is a slur upon us as a nation, that no general plan of national education has, up to this period, been determined upon; but most sad it is to contemplate, that, while the evils which result in so many different forms from the existing ignorance of the masses are so patent, the whole question remains at a standstill—not because we are unable to organize a scheme of national education, but because we allow the conflicting strife of different religious sects to interfere with the progress of education among the people. These sects, like the rival physicians of Le Sage, allow the patient to die while they argue about systems.

The urgency of the case, which is continually becoming more apparent, seems almost to warrant, if not to demand, that, to some degree at least, the compulsory education of the young should be made the subject of legislative enactment—notwithstanding the objections to what has been termed "meddling legislation."

There is, probably, no doubt that the failure in the satisfactory settlement of this question has arisen from the difficulty of dealing with the religious element involved; but surely it is time that the contentions of the religionist and the secularist should cease—looking to the urgent necessity for increased education, so very fully made apparent by the annual marriage returns. From the last published Annual Report, the 20th—viz., that for the year 1857—it appears that the number of persons signing the marriage register with marks was no less than 105,778—the proportions per cent. being of the men 72, and of the women 61 only, who were able to write their names, notwithstanding the progressive educational improvement which we are told has been going on since the passing of the Reform Bill in 1832.

The Dean of Carlisle, Mr. Close, no mean authority on the subject of education, attributes the failure of the several attempts to settle this question to the circumstance that too much has been attempted in all Bills that have hitherto been introduced into the House. He objects to one general plan of education, and is opposed to the institution of local rates for the purpose of supplying the necessary funds, whether such rates be voluntary or compulsory. In a pamphlet on the subject, he enters fully into the question; but it will be sufficient here to state, that a voluntary rate would clearly be most likely to be objected to by a majority of ratepayers in the very localities in which education was most required—in small towns and villages—where the ratepayers were but slightly in advance, in point of education, of those intended to be educated; and that the great argument against a compulsory rate is, that the ratepayers in that case would have a fair ground to insist that the management of the schools which they supported should remain in their own hands, and with this they could not be trusted at present.

Mr. Close considers that the course which would be most easily carried out in practice would be the extension of the present system of Government aid now actually in operation, leaving it to a trustworthy executive to determine in what manner, and to what extent, the ample public funds with which they might be entrusted should be distributed among the schools, in such manner as the very many different circumstances in which schools in large towns and small villages, in rich or poor neighbourhoods, and affected by manifold local influences, might seem to demand.

In some cases, the total expense of the schools might advantageously be borne by the Government; in others, such a course might be productive of evil, and have the effect of destroying the school; in such cases, either no assistance should be given, or some partial aid only afforded.

With due respect to Mr. Close, however, I must be allowed to express an opinion that his idea of "leaving it to a trustworthy executive to determine in what manner and to what extent the ample public funds with which they might be entrusted should be distributed," is just begging the whole question, and is, in fact, supposing the matter he has to provide for already decided. How is this "trustworthy executive" to be appointed, and of what religious party is this executive to consist, which is to have the disposal of large national funds? It would appear, from the statement of this gentleman—and it must be remembered that the name of the Dean of Carlisle has been intimately associated with the educational question for many years past—that, in practice at least, the religious element is not found to create the difficulty that might be imagined; and his plain common-sense view of the case would seem to show that the difficulties in the way of the satisfactory settlement of the matter are, to say the least, not of an insuperable character.

In all existing schools (of course, those assisted by Government funds are referred to), the Bible, we are told, is used, with one or two exceptions only; the Church Catechism, too, is taught in many schools in which the children of Dissenters are among the pupils; more or less tolerance upon points of religious teaching is displayed by the managers, and it is stated that, except in a few instances, those engaged in the actual instruction of the children of the working classes cannot complain of having met with any serious obstacles in preserving the religious portion of education.

In the hands of this executive—which would be composed, I apprehend, of all religious sects—Mr. Close, a clergyman, remember, of the Established Church (and one who may therefore be fairly considered to have his own bias in favour of keeping all education which is the result of a Government grant in the hands of the clergy), would be content to leave the power of determining, according to the local circumstances of each case, whether any particular school should be Church of England, Dissenting or mixed, or in the principles of the British and Foreign; and how, by whom, and in what proportion, the Bible should be read and the religious instruction given for the good of the whole community.

But, above all, he considers that the education of the children of the working classes should be made compulsory. "Slowly and reluctantly, and after struggling against this necessity for nearly 40 years," this practically-experienced authority says, "I am an absolute convert to this necessity;" and, looking to the figures just quoted from the marriage records, will anyone present say that this necessity is not apparent? The same influence that rendered legislation an absolute requirement of the age with the view to preventing the too early employment of children in factories—the covetousness, Mr. Close calls it, but I should prefer to say the necessities, of the parents—will ever be at work to restrain them from voluntarily giving their children the advantage of education, and probably, too, this effect will be increased in proportion to the improved education that the schools may provide; for it seems that it has been proved, and the opinion of one of Her Majesty's Inspectors of Schools is quoted in confirmation of the fact, that, "in many of our best schools, where there is every possible attraction of superior cultivation, where the best attention is devoted to religious training, and where every encouragement to success is held out, there the children are taken away at an earlier age than ever"—and why? because, by reason of the improved standard of education, boys of 9 years of age are more advanced than those of 12 used to be, and they are accordingly removed by their parents from school, to be placed at work—a strong reason, I submit, for the compulsory system of education.

It is satisfactory to find, by the last Report of the Inspectors of Factories, "that some instances have recently occurred of mill-owners giving a preference to the employment of young persons who are able to read."

Lord Brougham—who has done more for education than, perhaps, any man living—stated, in the House of Lords, towards the end of last Session, after alluding to the increase in the number of Day and Sunday Schools, and of the number of pupils who attended them, since the year 1818, that the difficulties of the question were increased by religious differences, and expressed his own opinion that he should prefer education even under the Pope of Rome to no education at all. As a means of improving the defective education of the next higher class in the social scale, he proposed that the Privy Council should have the power of inspection of the middle-class schools throughout the country, in addition to the inspection they now have the power to make of all schools assisted by a Government grant. This proposition, however, was objected to on the part of the Government, on the ground of the additional labour that it would impose if carried out. The suggestion was a most important one, for the recent middle-class examinations that have been established have shown that the middle-class schools of this country are far from imparting generally as sound an *elementary education* as even some of our national schools which are attended by the children of the working classes—the failures in the first of these examinations which was held having shown that a very much less number of candidates than could possibly have been expected gave evidence of being even decently grounded in elementary knowledge of the humblest character.

The National Education question at present stands thus:—

It having been, up to this time, found to be impossible, for the reasons adverted to in the foregoing remarks, to organize any permanent system, the education of the children of the working classes of this country has been carried on by means of Government grants, subject to certain conditions, which have from time to time been increased, in aid of the funds collected by private efforts in different parts of the kingdom.

The amount of Parliamentary grants voted for education in the year 1857 was £541,233.

A commission is now sitting, with the view to inquire into the whole question of Government grants for educational purposes; and the result of the report of the commissioners will possibly lead, at last, to some legislative measure for settling this long-debated question.

This may appear a lengthened digression from the exact subject of this paper, but I am anxious to show that the extension of education is what we must very much regard if we desire to amend the sanitary condition and so to improve the health of the labouring community, of which the bulk of the population is composed, and to diminish the unnecessary mortality that is shown at present to exist in this country, seeing that our efforts are so much checked by the ignorance and prejudices that we have to contend against.

The efforts of the Industrial Pathology Committee, in connection with the Society of Arts, are stated, in a paper by a member of that Society, to have almost entirely failed in their object, which was, to endeavour to mitigate some of the evils at present inherent in certain unhealthy employments, owing, I apprehend, to the apathy resulting for the most part from ignorance of the power of science to influence the matter.

In immediate connection with the too early employment of children in factories, just referred to, as affecting the question of education, the consideration arises as to the effect upon their health and longevity, which we shall consider hereafter.

Now, not only does the existing want of education tend to promote and engender disease, because parents, owing to their ignorance of the evils that are likely to result from such a course, persist in placing their children far too early at laborious employments; but the higher standard of education now happily beginning to be afforded to the present generation, tends, as has been shown, to increase the evil as affects the parents. It is not, therefore, probable that, until the last generation has passed away altogether, we shall advance as we ought; but, then, the present generation, having had the means of obtaining a higher class of information in their youth, will hardly fall into the errors committed by their fathers—of placing in turn their children so early at work as to render their proper education impossible; and so the tendency will be to increase the standard of education, and to diminish the evil consequences which result, in so many different ways, from a want of knowledge among the working classes. This is so far as the ignorance of the parents affects the question—how far the greed of gain, or the necessities of the heads of families, may still tend to bring about the same results, is another question; and hence the crying necessity that education should be compulsory, at least for many years to come.

Whether such a state of things should be allowed to exist, in which the labour of the young children of a family should be an actual necessity to enable the whole family to live, as now really is the case in some manufacturing districts, is a problem in political economy that cannot be discussed here.

To return to phthisis: the total number of deaths registered in the year 1857 under this head was 50,106.

If to this number we add the deaths which are classed under other heads, but which are likewise of a tubercular character—viz., hydrocephalus, tabes mesenterica, and scrofula—we obtain a total of deaths from tubercular diseases of 65,762; adding to this total the deaths from other diseases of the respiratory organs—viz., bronchitis, pneumonia, asthma, disease of the lungs, laryngitis and pleurisy, all of which are more or less of a character cognate to phthisis—we increase the total to 124,082; and if we further add one-half of the number of deaths ascribed to influenza, and one-half of those set down to hæmorrhage, we obtain a final total of 125,385. My object in including a proportion of the deaths under the two last heads is, as regards influenza, because this complaint is scarcely likely to prove fatal except in cases where there is a tendency to pulmonary disease, which influenza tends to develop; and as regards hæmorrhage, because a great proportion of the deaths recorded under this head no doubt resulted from hæmorrhage of the lungs following disease of those organs. It appears, therefore, that more than half a quarter of a million of the population—that 1 in every 5⅓, or nearly 19 per cent. of the whole number born in a year, fall a prey annually to that class of diseases which is so peculiarly fatal in this country. In other words, 1 in every 3⅓, or nearly 30 per cent. of the whole number of deaths occurring in this country in the course of a year, arise from one class of diseases alone.

Looking to such facts as these, it can hardly, I submit, be considered otherwise than an undoubted duty incumbent upon every one to render any assistance that may lie in his power, however slight his opportunities may be, in the investigation of the causes that may tend to produce such fatal results as the Reports of the Registrar-General annually record.

Phthisis, the indigenous disease of this country—a disease that has hitherto baffled our most eminent physicians—we do, I fear, our utmost to foster. Hear Dr. Guy—no mean authority on statistical and medical subjects.

In connection with a paper read before this Institute on the subject of "The analogy existing between the aggregate effects of the operations of the human will and the results commonly attributed to chance," Dr. Guy gave us some interesting verbal information on the subject of the mortality among the printers in the metropolis—a class that helps to swell largely the returns of deaths from phthisis. From some notes I took at the time, I am enabled to state the result of his investigation into the subject.

He had visited, he told us, the principal printing offices in London, which are, most of them, situated in the parish of St Clement's, in the Strand, or in that vicinity.

The offices, he found, were all close and dark, as most of the business premises in that locality are, and a great deal of gas is necessarily consumed, particularly in the winter months, a good light being required for printing operations, more especially in the composing-rooms, and every compositor requires a gas-burner to himself. The rooms in which the men work are, for the most part, small and low, and are heated with hot water. All the fire-places in the composing-rooms are found to be blocked up, for the twofold reason of saving space and of avoiding the risk of fire, so that all ventilation from the chimneys and open fire-places, which form so ready and satisfactory a kind of ventilation, is rendered nugatory. The men employed in the process of printing suffer very much from colds and are very sensitive to draughts of air, and dread even the slight current produced by a ventilator, if the proprietor of the establishment has been induced to fit one up, to such a degree, that they very generally take steps to check its action altogether. Above all, many printers are much addicted to drinking.

Looking to such facts as these, we cannot be surprised that phthisis is very prevalent among this class of operatives—the peculiar position in which they are placed, or in which they place themselves, being exactly one which, as medical men perfectly well know, fosters this disease, and thus printing offices become actual hot-beds for its propagation; and we find, that while 1 in 5 or 6 of the whole population die of phthisis or other cognate diseases—and this is a fearful proportion—among compositors no less than 2 in 7 fall victims to these maladies, the disease being in some cases brought on, and in others accelerated in its progress, by the bad local influences surrounding its victims.

With the view to obtain additional information on this subject, and to test the facts above stated from my own observation, at the present time—Dr. Guy's information having been obtained some years ago—I recently visited a large printing establishment employing about 300 hands, that of Messrs. Petter and Galpin.

The premises of this firm have lately been rebuilt upon an improved plan, and form a favourable contrast to those to which I have referred—and, no doubt, as the old printing offices come in course of time to be rebuilt, the evils now existing will gradually disappear.

From the information I obtained from the intelligent foreman of these works—Mr. Wilson—I am quite satisfied that printers' compositors generally, in London, are in a very unfortunate position as regards health and longevity.

Phthisis is their great enemy, brought on to a positive certainty if the faintest taint exists in the system, and in an incredibly short space of time; and generated, as it were, spontaneously in numerous cases where no such taint is discernible, but in which, possibly, there might be a latent hereditary disposition to the disease.

The principle causes operating to produce this result appear to be—

1. The closeness of the work rooms, the imperfect ventilation, and the impurity of the atmosphere of the small, low, and over-crowded apartments in which, for the most part, printers work—the impurity of the air being increased (in fact, rendered, I may say, deadly) by the quantity of gas—often very impure in quality—consumed, and the fact that little attention is paid to the necessity of providing an outlet for the products of its combustion.

2. The quantity of drink imbibed by the printers in some departments of the business. Many drink, it seems, not only beer, but gin, rum, and brandy, and no surer means than these could be suggested for increasing the bad results likely to ensue from the evils under the first head.

3. The inhalation of dust from the types, which are composed of antimony and lead. This dust is being constantly disturbed, owing to the necessity of shaking up the masses of distributed type in order that the compositor may take quickly in his fingers the letters he requires to use, and that he may be enabled to place them in the necessary position for performing the operation of composing easily and quickly—a great desideratum in printing.

With reference to No. 1, it is clear that the evils complained of under this head are quite capable of remedy; and the same may be said of No. 2. Some inconvenience under No. 3 must, I suppose, continue to exist.

Thackrah, in his treatise *On the effects of Arts, Trades, and Professions, on health and longevity*—a work published as long ago as 1832, and which might, therefore, be considered not to be applicable to the state of things at the present time—refers to the injurious effect produced by the heated types upon the health of the workmen. Although many of the processes of manufacture to which he alludes are certainly now obsolete, and some of his remarks therefore do not now apply, it is remarkable how applicable some of his observations on many points still continue to be, showing how little has been done towards remedying those evils which affect the health and longevity of the operatives, and which were pointed out nearly 30 years ago. Thackrah mentions that printers suffer injury from the types, which, being composed of lead and antimony, emit, when heated, a noxious fume injurious to respiration, and which produces partial palsy of the hands; and adds, that all danger may be avoided by abstaining from using the types until they are cold. This evil, I believe, no longer exists—in London, at all events—though it has taken many years to abolish. It is well known to intelligent workmen in the trade that this consequence would ensue from handling the types when in a heated state, owing to the antimony in their composition; but there is no necessity in the world for their doing so.

The types are cleaned with lye, an alkaline mixture composed of potash, pearlash, and soda—in which composition there is nothing injurious—and the lye is washed away with cold water, so that the types are not necessarily heated at all, and it is only when heated that antimonious fumes are generated.

It used to be the practice of some printers to dry the types when wet (and it is necessary that they should be wetted, for in that state they can be more easily distributed) upon a stove, and there is no reason, I believe, to doubt that if this were done to any extent, and the types used while still heated, paralysis of the hands and arms would be the result; but this fact is now so well practically known to the trade, from cases that have occurred, that, I am credibly informed, the practice has long since been discontinued.

Compositors frequently fall victims to phthisis at the early age of 30, and probably 40 would be too high a mean age to assign to them as a body.[*]

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[*] Since writing the foregoing, I have been favoured by Mr. David Arnot, the Secretary of the Metropolitan Typographical Widows' Fund, with the Annual Reports of that Society extending over 10 years, from which I find that the average age at death of the printers who were members of the Fund was 48 years.

The number of deaths caused by phthisis and other diseases of that class among the members, in the ten years ending 31st December, 1859, was 101 out of a total number of 173, being 58¾ per cent. of the whole.

We find, accordingly, from these returns, that 4 in 7 die of these diseases.

Dr. Guy, it will be remembered, ascertained that in the cases he investigated among printers, 2 in 7 fell victims to phthisis; probably, however, he did not, as I have done, include other diseases of the respiratory organs, which would account for some difference in our results.

It must be remembered, however, that men who become members of provident societies are naturally of a superior class. They are, besides, in the enjoyment of good health at the time of entry; and, accordingly, more or less select lives.

Fortunately, they have their sick clubs and houses of call, which are not now, as formerly, public-houses, but private establishments supplied with reading rooms and libraries, where the men, when out of work, are to be heard of if wanted at a moment's notice, as is often the case in the printing business.

I say they have such establishments to which they can go in their leisure hours, but, unfortunately, many still prefer to frequent the public-houses.

This sort of evil is, no doubt, much encouraged by the arbitrary regulations enforced by the combinations that exist among the men engaged in printing, in common with many other trades, as the recent strike among the builders has shown, and by which the hands are compelled to obey certain rules and conditions in taking engagements, many of which encourage and necessitate the expenditure of money in drink—the object of the combination being to keep up wages, which free and independent competition, it is thought, might tend to lower. The sight of compositors is frequently very much weakened; ostensibly, by the constant close application to minute type, but, possibly, in a measure, as well by the quantity of snuff that they take, which cannot fail to be injurious in its effect. The practice is commenced with the view of stimulating the faculties, and particularly the sight; this effect, however, which it does seem to have at first, soon ceases, but the habit then has become confirmed.

Besides the injury from the use of tobacco as snuff, the adulteration, particularly of the commoner sorts, with sundry compounds and, amongst others, with ground glass, tends to increase the injurious effect, and renders the use of snuff most pernicious. The ground glass is mixed with the snuff to make up for the want of pungency, which is diminished by other adulterations. Carbonate or sub-carbonate of lead, too, is found in snuffs in considerable proportions, and is formed by a chemical combination of carbonic acid, which is stated to be gradually evolved from the snuff, with the metallic lead in which the article is very generally packed. The carbonate thus produced penetrates into the mass, and has been found in the interior of a packet of snuff to the extent of ·951 per cent., and on the outside layer of a sample which had been in actual contact with the metallic lead, to the extent of 2·743 per cent., according to the experiments of M. Wicke. Taking, then, the mean of these two percentages, we find nearly 2 per cent. of this pernicious salt in any given portion of the mass. This carbonate or sub-carbonate of lead, which is also known by the name of cerusse or white lead, is probably the only deleterious salt of that metal, and is of such a nature that not only is it seldom used internally in medicine, but when used externally, in the form of a powder or ointment, great caution is necessary in its application; and yet the habitual snuff-taker, daily, without fear of the consequences, takes this deleterious poison into his system. A moderate snuff-taker will consume about two ounces of snuff a week, so that, allowing for waste, he will take say 100 ounces in the year; of this, accordingly, nearly two ounces will consist of subcarbonate of lead, a highly-poisonous salt of that metal. This is a moderate estimate; some snuff-takers consume considerably more. The Reports of the Analytical Sanitary Commission, recorded in the *Lancet,* showed that of forty-three samples of snuff, chromate of lead was found to be present in nine, and oxide of lead in three cases. The presence of the lead was attributed by the commission to intentional adulteration. Saturnine disease has been clearly shown to be caused by the use of snuff thus adulterated, no less than by other well-known means by which the system becomes impregnated with lead. Printers begin the habit of snuff-taking by using Grimstone's eye-snuff, which is the mildest form in which snuff is manufactured, and so get on until they come to take Gillespie's, the strongest preparation made.

It has been considered that the digestive functions may suffer injury by reason of the long-continued standing posture which habit has necessitated in the printing trade. I have not, however, been able to ascertain that printers suffer in this respect, or from rupture or varicose veins, more than other classes of operatives that are obliged to stand long at a time—all such being liable to injury in these respects, but to a much less serious extent, I apprehend, than those whose labour necessitates the stooping posture or any pressure against the chest, as in the Sheffield grinders, in shoemaking and wig-making, for example. There is, however, no reason for the maintenance of the standing posture by compositors; contrivances have been invented to support the body and relieve the pressure on the legs entirely, but from the habit of a sort of circular motion round the case, during the process of composition, being acquired by the men, they seem always to prefer to work standing; and at times they work very long hours—thirty-six hours, perhaps, without cessation, except for meals. This practice, however, is only, I believe, owing to habit, and it is extraordinary to observe how the working classes cling to old habits and customs, at the expense often of their health, and all owing to a want of knowledge of the evil results that are certain to be engendered by a perseverance in them; and this affords another instance of how much an extension of education is called for among the working classes.

So with the shoe-makers and wig-makers: these workmen are very likely to be injured by the pressure of the last and block against the chest, but they cannot be made to see it.

An arrangement to prevent the necessity for stooping over their work, and to obviate the pressure of the last, has long since been invented for shoe-makers; and I have ascertained that a similar contrivance, arising perhaps out of the former, has been arranged for wig-makers, consisting of an apparatus for fixing the wig-block, to remedy the injurious effects that had been observed to exist; but neither of these inventions are in general use.

Numerous instances of this class might be adduced, to show the indifference exhibited by artizans in availing themselves of means that may be suggested by the ingenious and philanthrophic for remedying the pernicious results that arise from some species of occupations. This "sure it was always so" and "never heed it" spirit will be found to prevail, with greater or less intensity, in proportion to the indigence and ignorance of the unhappy sufferers.

Some injury to health is likely to be caused by attendance in the drying-room of printing offices, where the newly struck-off sheets are hung up to dry, and which is heated by hot water or steam to a temperature of about 70° Fahrenheit. The men who are much exposed to the high temperature and moist air of this department, if constitutionally disposed to suffer from heat and damp, are not unlikely to be injured by such exposure.

The laborious movement of the heavy levers by which the hand presses in printing offices are worked, would strike an observer as being likely to be injurious, from the tendency to contract the chest, which the action certainly has; but this labour is alternated with that of inking the types by passing the roller over them, a far from heavy work; and since at each press two men are always employed, the heavy mechanical labour is divided between them, so that no injurious result is likely to happen to strong men from this cause.

Of late years, owing to the street improvements in the populous neighbourhood in which printing offices abound, the small houses where printers, as well as other men engaged in works in the vicinity, used to live, have, in many instances, been, and are being, pulled down; and the consequence has been, that the operatives have been driven over the bridges, to the evident improvement of their health and social position; for the walk to and from the scene of their labours cannot fail to conduce to health, both on account of the exercise they obtain in the open air, and by the change of scene which acts on the mind. The fact of their living in a purer air too, and the tendency to resort less to the public-house, which is brought about by their having a more airy and more pleasant residence a little way over the water, and a garden, perhaps, with which to amuse themselves, has tended to improve, to some extent, both the health and habits of this class of men.

I have mentioned that, in course of time, as the old printing offices come to be rebuilt, more attention will, no doubt, be paid to promote the health and comfort of the workmen. This is evidenced in the establishment of Messrs. Petter and Galpin, who carry on a general printing business in which no such appearance as that which Dr. Guy describes is visible. In the first place, the men are more favourably situated in an ordinary printing office than in the office of a newspaper, where the principal work is at night. The men engaged on newspapers are always, so to speak, working at high pressure, since the papers must be published within a very few hours after the events they record have occurred; and night work is always more trying than work by day. In the establishment just referred to, the composing-room is 8 feet in height, and its dimensions 86 feet by 50; and in it every possible attention seems to have been paid to ventilation, by means of siphon ventilators in the roof, the effect of which is to ensure a proper amount of ventilation without at the same time creating draughts of cold air, which printers seem so much to dislike, owing, of course, to their having been so much accustomed to be shut up all day, and perhaps half the night as well, in low-pitched and heated apartments. The ventilation is also increased by a large opening in each floor for the purpose of working lifts from the basement to the top of the building. A bad effect of this, however, is, that the foul and heated air is carried up to the composing-room, which is in the upper story; and it is, of course, the most vitiated air that finds its way up there. These openings, however, cannot be done without, as it is absolutely necessary, in a large establishment, to have certain powerful steam or hydraulic lifts, for the purpose of raising the heavy forms of type which require to be conveyed from the composing-room to the machine-room. Under these circumstances, then, it would appear to be advantageous to increase the altitude of the composing room, making it at least as high as the machine-room, which is 14 feet in height—6 feet higher than the former. The position in the building of these two rooms it would scarcely be possible to reverse, as the great weight of the machinery employed renders the desirableness of placing it on the ground floor, if possible, clearly apparent. A slight alteration in the method of constructing the roofs of printing offices and factories generally, and one that could be carried out very inexpensively, would tend materially to obviate an inconvenience of another kind, viz., that arising from the heat during the summer months, caused by the sun's rays shining directly on the heads of the workmen through the skylights with which the upper stories of such buildings are usually lighted. It is only when the sun's rays are so strong as to prove injurious in this way, that the gas, which has so evil an effect, and which it is necessary to use at all other times, is capable of being dispensed with, and another source is thus opened up whereby suffering is unnecessarily entailed upon the operatives. This inconvenience may be remedied by means of dormar windows in the roof, in place of the obnoxious skylights. I have seen this plan carried out at the printing office of Messrs. Wertheimer, to the great comfort of the men employed. Of course, when the roof is sloping, as is often the case, these dormars are more than ever desirable, as increased height is gained by their adoption. Care should be taken not to glaze those sides of the dormars which, from their position, are most exposed to the sun's rays; or, at least, they should be fitted with shutters. I have been induced to dwell somewhat on this subject, because the same remarks apply to factories of all descriptions. The suggestions I have thrown out, it will be borne in mind, are not those of an architect, but of an unprofessional man, who, from personal observation, has seen and regretted the unnecessary injury to health and longevity to which large classes of our labouring community are often most cruelly subjected.

If the metropolitan inspectors of buildings were vested with some discretionary powers to see to the appropriateness of the buildings under their *surveillance*, as respects their answering satisfactorily, in a sanitary point of view, the objects for which they were intended, it is possible that some diminution of the evils I have pointed out might be the result.

It is very difficult to ascertain satisfactorily the causes that tend to produce phthisis, and to reconcile the apparently anomalous results of the observations of different writers on the subject.

Even with respect to the effect produced by the inhalation of dust, which has generally been considered to be the most fertile cause of this complaint, great difference of opinion seems to prevail, and the statistics of the most celebrated investigators of the question are far from agreeing in their results.

Dr. Knight, of Sheffield, has shown that the grinding and polishing of steel causes phthisis in an unusually short period; and that out of 250 workmen engaged in the occupation of polishing steel, 154 suffered from affections of the chest; and that there was no case of a person engaged in polishing forks reaching his 36th year—magnets, wire masks, currents of air, and moisture, having been successively tried for the purpose of arresting the passage of the metallic particles to the lungs, but without diminishing the mortality: while Dr. Cowan, in his notes to the translation of the celebrated work on phthisis, by M. Louis—the greatest authority, probably, in Europe, on the subject of phthisis—considers that the evidence brought forward on this point tends to an opposite conclusion. Dr. Cowan seems to consider that the grinders, who, he says, were not an unhealthy set of men previous to the commencement of the last century, have become so from the fact of their now pursuing their trade in close rooms, whereas they used to carry on their business in the country in large open rooms; from their working 16 hours a day at grinding only, instead of working 4 or 5 hours a day, and combining with the operation of grinding other less injurious departments of the trade, such as hafting and forging. The division of labour is now carried to great excess in this trade. He attributes much of the injury caused by grinding to the posture in which the grinders labour. They work with the shoulders elevated, the elbows resting on the knees, and the body inclined forwards. Thackrah, again, considers that the angular or pointed form of the particles detached is the chief cause of the injury to workers in iron; for the dust from old iron, which is thrown off, he tells us, so copiously as to deposit a thick brown layer on the dress of the dealers in the article, produces no inconvenience. M. Lombard, from inquiries made at Geneva, found that one of the principal causes tending to produce phthisis was the inhalation of air in which mineral and other dusts were floating; and showed that, among polishers, sculptors, stonecutters, plasterers, watch-hand makers, and others of that class, the proportion of consumptive complaints was 177 in 1,000—the general average number of such cases, in all the professions in Geneva combined, being 114. Again, with reference to mineral, vegetable, and animal particles, the results of the inquiries of

MM. Benoiston and Lombard appear to be exactly the reverse of each other—the former making animal particles the most injurious and mineral the least, and the latter entirely reversing the order. The inquiries of Drs. Young, Leblanc, and Alison, are generally considered to determine the question of the liability of stonemasons to consumption. Dr. Cowan, however, does not entirely assent to their dicta. Certainly, from the observations of M. Benoiston, it would appear that the proportion of cases of phthisis among quarrymen, stonecutters, and marble-workers, was less than the general average; and it is stated, that in a department of France (Meusnes) celebrated for the fabrication of millstones, in a period of 17 years no increase of mortality from phthisis, as compared with other departments where stone-cutting was not general, was to be detected.

M. Lombard, however, found sculptors, stonecutters, and plasterers, afflicted with the disease in a high degree; and Thackrah found this class of persons to be phthisical and short-lived, dying generally before attaining the age of 40.

Upon the whole, Dr. Cowan considers, that, "were the existence of tubercular disease ascertained, the influence of dust in its production is still undecided; and that the hard nature of the material, the partial exercise of the body, exposure to varieties of temperature, their habits of intemperance, &c., probably exert a far more powerful influence."

M. Lombard considers, on the whole, "that the influences which modify the *system in general,* such as a sedentary life, &c., &c., are more active in the production of phthisis than those acting *locally* upon the lungs, as dust, vapours, &c.; and if we reflect that the *latter* agents are never present independently of the former, their *real* activity, as causes of pulmonary tubercles, is, at best, but problematical."

Dr. Clarke, who has written on this subject in the *Cyclopædia of Practical Medicine,* observes, that "in almost every instance the sufferers are exposed to causes, independently of dust, fully adequate to the production of the tuberculous cachexia."

It will be seen, from these considerations, how difficult it is to disunite and sever the manifold predisposing causes that may lead to the production of phthisis; the effect of this is, that we find among the conditions tending to create this disease, many which, to say the least, we are accustomed to consider as most favourable to ensure immunity from the complaint.

We are likely more especially to observe this in the returns of

M. Lombard, since his investigations comprehend so large a number of cases, and, in proportion as the number of facts recorded increases, so do we more nearly approximate to an investigation of the mortality of the whole population from this disease; for, of course, if we were to inquire into the number of deaths from phthisis in every calling, we should in fact be investigating the mortality from phthisis of the entire community, and it is absurd to suppose that there is necessarily a predisposing cause to the disease in question in *every* possible condition of life; hence it follows that, in any very extensive inquiries into the relative effect of different occupations in the production of phthisis, a certain proportion of deaths from that disease is attributed to local influences, which may possibly have no effect whatever on their production; and this the anomalies apparent between the statistics of different inquirers into the subject seem clearly to show. In many conditions of life, therefore, we ought perhaps to endeavour to discover other causes for the disease than those set down by the statist, who merely records the fact that, out of a certain number of deaths from phthisis, so many occurred to persons who were exposed to peculiar influences, such as, for example, "muscular exercise, and active life." We should hardly say this could be the cause of the large percentage of deaths recorded under that head in the returns of M. Lombard. In point of fact, all writers on the question appear to unite in recommending muscular exercise and active life as amongst the best safeguards against the ravages of phthisis. We may therefore look for some other cause, and may probably fairly consider, from what we know as to the hereditary nature of this complaint—and this fact is not made an element in the classification of deaths, under the head of occupations—that of 100 persons dying of phthisis, in a certain percentage of the number no particular predisposing cause could be traced; but it was observed, that this percentage of persons was placed in a position to conduce to the use of muscular exercise, and to the leading of an active life, which, so far from being the *cause* of their death from phthisis, had, in all human probability, the effect of retarding the fatal issue of a disease which had, perhaps, been hereditarily transmitted to them, and in which the taint was too strong to be overcome by the favourable circumstances in which the victims were placed—such an hereditary taint being, unhappily, too well known to exist in families, and to be capable of transmission from generation to generation, as we shall presently see.

With reference to the effect on the constitution of the most laborious muscular exercise, I may mention, that from an inquiry into the subject, instituted by Mr. John Whitterom, into the health of the forgemen in the low moor district, it was shown, in a paper read at the recent meeting at Bradford of the Society for promoting Social Science, that the mortality of that class of men whose muscular labours were of the most laborious nature, was but slightly in excess of the general average of the country; and further, that notwithstanding the slight excess apparent in respect of mortality, they were not exposed to the same amount of disease as the ordinary out-door labourers employed in the same district.

Similarly of the "exercise of the voice": when not carried to a most unusual extent, provided the lungs are not seriously advanced in disease, the due exercise of the voice has always been considered as likely to improve their strength, and to increase, not only the capacity of the chest, but the muscular development of the whole of the upper part of the body. This we see frequently evidenced in singers; but even in persons with weak lungs, where actual disease does not exist, judicious exercise of those organs is one of the best methods of increasing their strength.

It is related of Cuvier, the naturalist, that he ascribed his own exemption from phthisis, with which disease he was threatened at the period of his appointment as Professor at the College of Surgeons, to the practice of public lecturing, which this position necessitated. This result was due, no doubt, to his lungs being in such a state as to be improved by the exercise of speaking aloud. Had the disease been further advanced, its progress would doubtless have been accelerated.

We may, perhaps, be justified in considering that the exercise of the voice, which appears as a cause of disease in the records of M. Lombard, was excessive, or that the hereditary taint was implanted in the lives under observation, or, perhaps, that both reasons aided in bringing about the result recorded, if, after what has been said, we are to take any note of this condition as a cause of the complaint at all. "Living in the open air" has always been considered to be most conducive to health, and persons whose avocations necessitate this mode of life are usually healthy and long-lived; and this is the case, I apprehend, even with persons exposed to such vicissitudes of the weather as might be deemed to be excessive —exposed, in fact, as much as they can be. We can only, therefore, imagine the existence of the hidden hereditary taint in this class too, supposing, in this as well as in the previous cases, that no other more patent reason for the creation of the disease were to be discovered. In confirmation of the opinion as to the advantage to be derived from open-air employments, I may refer to the Reports of the Registrar-General, in one of which it appears that of twelve classes in the tables—consisting of tailors, shoemakers, farmers, carpenters, butchers, persons engaged in wool, cotton, and silk manufactures, bakers, inn and beershop keepers, grocers, miners of all descriptions, labourers, and blacksmiths — among which a comparison was instituted, the farmers were found to be the longest lived.

The Registrar, in alluding to this class, and in speaking of the advantage to Assurance Offices and to Friendly Societies of a knowledge of the facts contained in these tables, states that "it is evident that the lives of farmers, for example, may be safely insured at much lower rates than the lives of licensed victuallers."

Now, with all due deference to the Registrar, this is not quite the way to put the case; and probably the actuaries present will agree with me, that the experience of Life Offices shows, that if the lives of farmers may be safely assured at the ordinary rates, the lives of licensed victuallers, if they are taken at all, should be assured only at an extra premium—the rate of mortality among the class of innkeepers being in excess of that among all the other eleven classes just referred to, at all ages, except the class of butchers in one particular decade of ages, viz., those between 55 and 65, the butchers dying at the rate of 41 in 1,000, while the innkeepers died at the rate of 39 in 1,000; so that even in this decade the innkeepers were not much longer lived than the butchers, and at all other ages the mortality among the innkeepers was the highest of the twelve classes under observation.

The rate of mortality among the whole population at the ages just quoted, 55 to 65, was only 30 in 1,000.*

Of late years, Assurance Companies have been on their guard against this class of persons, and some Companies decline to entertain proposals for assurance on the lives of innkeepers altogether.

As a class, they are exposed, the Registrar-General tells us, "by their business, to unusual temptation, live intemperately, and enjoy less quiet than the rest of the community. They are exposed also to zymotic diseases, by intercourse with large numbers of people."

The result of this investigation points very clearly to the fact, that intemperance may have no inconsiderable effect in unduly swelling the records of the Registrar-General.

With reference to the deaths set down to the cause of "animal emanations," much difference of opinion, I find, prevails as to whether such a cause as this may be considered generally to affect health injuriously.

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* *Vide* the 14th and 15th Reports of the Registrar-General, p. xv.

The deaths from phthisis, among the class of persons, according to the statement of M. Lombard, exposed to animal exhalations, though not so numerous as those that are stated to have occurred from the other causes quoted, are nevertheless considerable in number. The Registrar seems to consider that the great mortality among butchers may be owing to what he states to be the most probable cause, viz., the element of decaying matter by which they are surrounded in the slaughter-house and its vicinity.

This is, however, nothing but matter of opinion, though no one perhaps is more competent to form a correct one on such a subject than the Registrar-General. It certainly is not found, however, that those persons who are exposed to animal exhalations of this nature are generally *unhealthy*. We may, therefore, fairly look for some other cause as tending to induce the great mortality of this class.

The high death-rate among butchers could perhaps be traced to other causes than those just referred to; indeed, the Registrar only throws out for consideration the suggestion, whether what he mentions may not be the most powerful reason for the high mortality among them. The other probable causes that he mentions are, the excess of animal food in their diet, the fact that they often drink to excess, and that they are much exposed to heat and cold.

It is not impossible that the actual inoculation of the systems of butchers with decaying animal matter may be the cause of not a few deaths; and the constant exposure in their open shops to draughts of air—the extent of which, in windy weather, is very apparent from the effect on the gas-burners—may not improbably have an injurious effect; while the quantity of foul gas consumed in the unprotected burners will hardly tend to purify the atmosphere. The Registrar observes, that the red injected face of the butcher is an indication of disease—to the ordinary observer this might be an indication of robust health. Similarly with respect to brewers' draymen: their appearance would indicate that they were blessed with strong constitutions; this is not, however, the case. It is found, in the hospitals, that these men are a very difficult class to treat when attacked with inflammatory symptoms; and they are very prone to such attacks, and succumb readily to them. Their horses, which are good matches often for their masters in appearance, have very much the same attributes as the men; and as the draymen probably acquire their peculiarity of appearance and of constitution from the quantity of beer they imbibe, and owing to the insufficient amount of active walking exercise they take in proportion to their potations, so, perhaps, are the horses affected by much the same causes, by being fed to some extent on the brewers' grains, which act, no doubt, on their livers as the beer does on those of their masters. These horses are far from strong, though they look so fat and comfortable as to have given rise to the expression, "I would I were a brewer's horse;" and they can endure about the same amount of bodily labour, proportionally, as the draymen, and that is not much.

In connection with the subject of the inhalation of foreign particles, I may state that the workmen employed in flour mills are grievous sufferers from a spasmodic affection of the lungs, caused by the inhalation of minute particles of dust with which the atmosphere of most flour mills, as usually constructed, is impregnated; and I have been informed by the proprietor of some extensive flour mills in Birmingham, that if the workmen who suffer in this way continue too long in the business, a fatal result would be certain to ensue. I have great pleasure, however, in adding, that this gentleman—Mr. Evans—has introduced into his mills an apparatus for remedying the evil consequence just mentioned. He was kind enough to take me over his works, and personally to explain the action of the improvements. In the portion of the mill into which the ground grain is delivered into bins from the upper part of the mill, where the grinding process goes on, the atmosphere in which the men have to work had, prior to the introduction of his improvements, been completely impregnated with fine particles of flour dust; and these, from being the portion that was affected by the air, you will understand, consisted of the very finest particles of the flour—being, in fact, an almost impalpable powder—and, of course, by consequence, the more penetrating and the more likely to be inhaled and to be carried into the minute air cells of the lungs in exact proportion to its impalpability.

The effect of such inhalation is the production of a spasmodic action, which is excited by the physical contact of these minute particles with the delicate surfaces with which they are thus brought in contact. The lower parts of Mr. Evans' mills are now free from dust, and the effect is produced as follows:—

The ground grain descends from the upper portion of the mill through tubes of wood, and is delivered into bins placed on the ground floor. As the flour runs into these bins, in mills of ordinary construction, a cloud of fine dust is emitted, of the before-described injurious nature. In these mills, however, by means of a fan, worked by the steam-power used for driving the ordinary mill machinery, a current of warm moist air is made to take such a direction as to cause the light obnoxious particles of flour-dust to ascend up a wooden tube to an upper floor, where the dust accumulates, and is swept up twice a day.

There is, accordingly, no reason whatever why flour mills should continue to remain the death-dealing receptacles many still are. Surely, looking to the disastrous results entailed under the ordinary system, it should be made compulsory on every proprietor of such an establishment to introduce improvements of this nature, when it is shown by actual trial how fully they answer in practice, and by how inconsiderable an amount of expense the decimation of a portion of our labouring community may be prevented!

It is required, by legislative enactment, that the machinery used in driving mills should be so fenced off as to prevent accidents to the lives and limbs of the operatives—why should not the preservation of their lungs, and thus of their health and lives, be equally attended to? We can exist without our legs and arms, but the free action of our respiratory organs is an essential requirement of our being.

Mr. Evans has set a noble example, in spontaneously taking the initiative in a sanitary mill-reform of so much importance.

Injurious, however, as the effects of the inhalation of soft vegetable dusts may be, they are probably less serious than those resulting from that of metallic and stony particles.

With reference to stone-cutters, to which class previous reference has been made, the late Hugh Miller, in the history of his life, thus speaks as to the effect of the inhalation of the dust of stone.

It will be remembered that this eminent geologist was originally a mason. He found, he tells us, that during his apprenticeship the dust of the stone had an injurious effect upon his lungs; and that after he had been engaged in the occupation for two years, he began to suffer so severely that he was obliged, though a poor man, to discontinue his occupation for a time.

This observant writer states, as the result of his own personal knowledge of the subject, that, at the stage of the malady at which he had arrived, poor workmen who may be unable to give up their employment sink, in six or eight months, into the grave. So general, indeed, is the affection, that few of the Edinburgh stone-cutters pass their 40th year unscathed, and not one out of every 50 ever reaches the 45th year.

In his case, after being engaged in hewing stone only two seasons (I should mention that the masons in the north only work during the six summer months), the dust of the stone inhaled at every breath had exerted the usual weakening effects on the lungs; and, after working day after day with wet feet in a water-logged ditch, he began to be sensibly informed, by a dull depressing pain in the chest and by a blood-stained mucoidal substance expectorated with difficulty, that he had already taken harm from his employment.

Hugh Miller, however, seems to have been blessed with a good constitution, and being enabled to give up his occupation for some months, he threw off the disease with which he was threatened.

The disease which causes death in these cases seems to be created by the mechanical irritation of the fine and hard particles of stone, which fret the delicate air passages of the respiratory organs, which accordingly become charged with matter and stone dust, and the eventual result appears to be death by phthisis or some allied complaint.

I may mention a very curious circumstance bearing on this question, and one which it is difficult to understand, but yet which is found to be a fact, viz., that the most sober workmen engaged in this occupation are the first to suffer from the results just detailed.

Hugh Miller was a most temperate man, and it was confidently predicted by his comrades that he would suffer for his sobriety, by being the sooner affected by the stone-cutters' malady. "A good bouse," they said, gave a wholesome fillip to the constitution, and "cleared the sulphur off the lungs;" and that his would suffer for want of the medicine which kept theirs clean. Whether there was any virtue in their remedy or not, it is just possible—Hugh Miller considered—that the shock given to the constitution by an over-dose of strong drink might, in certain cases, be medicinal in its effects.

Judging, however, from the information possessed by Life Assurance Companies, and from what the Registrar-General tells us about innkeepers, very few in this room would be willing, I imagine, to try the prescription of the stone-cutters of the north.

In this case, however, they were right in their predictions as to their fellow-workman being the first of his party to be affected by the malady; but his recovery, after a few months' cessation from the work, and his ultimate power of contending with and conquering the disease, arose, no doubt, as well from his extreme temperance as from the original strength of his constitution.

Having read in an article by Mr. William Jones, treating of the effect of different occupations on health, published some time ago in the *New Monthly Magazine*, that a preparation of the lungs of a mason who had died from phthisis was deposited in the anatomical museum of the Edinburgh College, showing the air cells literally blocked up with fine particles of dust, I have taken some trouble to ascertain whether this is really the fact, as a strong opinion appears to prevail that, in cases of this nature, the stony character of the deposit in the lungs is due to disease, and not to inhalation. I have positively ascertained that there is no foundation whatever for this statement.

In the Museum of the Royal College of Surgeons of Edinburgh, there are two preparations, consisting of sections of the lungs of stonemasons, put up in spirit.

In both there is a deposit of tubercle, and cavities have been formed, lined by false membrane.

These have just been examined by Dr. Sanders, the Conservator of the Museum, at the request of Dr. Douglas Maclagan, the President of the College, with the special object of determining the point now under discussion.

I have to record my obligations to both these gentlemen, for their courtesy, and to the latter, in particular, who has been so good as to enter very fully into the subject with me.

Portions of the lung tissue, of the tubercular matter, and of the false membrane of the cavities, were examined by Dr. Sanders, under the microscope, and with the addition of nitric acid, &c., but in none of these was there any appearance of particles of stone-dust. The sediment, moreover, that had fallen to the bottom of the jars, was likewise examined, and was found to consist of organic matter only, chiefly of cholesterine, but no particles of silica or carbonate of lime were found to be present.

It did not, therefore, appear to Dr. Sanders that there was any stone-dust in the portions of the lungs he examined.

There is, also, a preparation of the lung of a stonemason in the University Museum, which is, probably, the one referred to by Mr. Jones.

Dr. Maclagan informs me, that this specimen does not present any appearance different from that of an ordinary tubercular lung. This gentleman has taken the trouble to investigate the origin of the story, which he considers to be a pathological romance.

It seems that the deceased was a mason who worked in granite; he died phthisical; and his lungs were found to contain some grey tubercles, mixed with some of the usual carbonaceous deposit seen in most adult lungs. The Museum porter was an acquaintance of the deceased, and remarked that his friend's lung *looked like* a bit of the granite with which he worked.

It will be seen, from this investigation, how careful it is necessary for inquirers into such subjects as these to be, to ascertain the truth of the statements that are met with in unscientific writings.

Dr. Maclagan informs me, that he has had an opportunity of examining the lung of a Sheffield fork-grinder, in the museum of Dr. W. Gardner, who exhibited to him a sample of the dust separated by the grindstones. The latter was composed entirely of black particles, some of an irregular shape, and others in round globules, which were entirely attracted, Dr. Maclagan says, by the magnet—being either metallic iron or the metallic oxide. There were also a few particles of silicious matter, from the grindstone, mixed with the metallic particles.

The section of this lung was examined microscopically by Dr. Cleland, Demonstrator of Anatomy in the University, who could see, it appears, none of the iron particles.

Dr. Maclagan further examined this lung, by drying, pulverising, and then bringing the magnet over it, but not a trace of iron was separated from it.

Any attempt, therefore, on the part of these gentlemen to find inhaled particles was fruitless.

Dr. Maclagan, however, is of opinion, that this is no proof that such particles may not have been inhaled, and thus have been an exciting cause of disease; for he does not see, he informs me, how we could expect particles inhaled into the pulmonary cells to remain there in a disease in which there is so much expectoration, and in which the victims must be off work for some time before death.

This opinion, it will be seen, agrees exactly with what I have stated elsewhere, as the result of other inquiries into the subject.

It may also be open to conjecture whether a deposit of such a nature may not be the result of some chemical action taking place in the system, it being well known that carbonic acid will hold a large quantity of lime in solution, forming carbonate of lime, which would be deposited upon the acid being set free.

Patissier seems to consider that the stone-dust is deposited bodily in the lungs. He says, in his *Traité des Maladies des Artisans*, "La poussière qui se détache des pierres pénètre par la bouche dans les poumons, s'arrête dans les voies respiratoires, se mêle aux mucosités dont ces organes sont lubrifiés, *et forme parfois de vrais calculs,* qui donnent naissance à la toux aux hémoptysies, et peuvent même occasionner des pleurésies des péripneumonies dangereuses."

Deslandes, on the other hand, seems to hold an opinion exactly the reverse of that of Patissier. He says, in his *Dictionnaire de Médecine et de Chirurgie Pratiques,* "Longtemps les matières crétacées que l'on rencontre dans le voisinage des bronches, et même les tubercules des poumons, ont été attribués à des agglomérations, et même à l'absorption de molécules pulvérulentes. Cette opinion ne mérite plus aujourd'hui qu'on s'arrête pour la réfuter. Quant à séjour des poussières dans les voies aériennes, il y a lieu de penser, avec Laënnec, que le plus souvent, il doit être fort court."

Dr. Hodgkin, in his *Lectures on the Morbid Anatomy of the Serous and Mucous Membranes,* mentions that "An idea has been advanced, that earthy collections in the lungs are sometimes produced by the inhalation of impalpably fine dust, to which some persons are, by their occupations, exposed; and the workmen of the quarries of Montmartre have been cited as instances of this fact. Although there can be no doubt that the inhalation of the atmosphere highly charged with mineral particles, however minute, must be a highly deleterious source of irritation, and, consequently, be very liable to become a fruitful cause of those affections which I have mentioned as producing calculi in the lungs; yet it appears extremely unlikely that, under ordinary circumstances, the earthy particles should either penetrate profoundly into the substance of the lung, or be so partially collected as to form concretions. It is more probable that they would be arrested by the mucus of the air-passages, and voided by the efforts at expectoration excited by the irritation which they induce."

Probably, on the whole, the opinion of the medical profession generally is in favour of the assumption that any calcareous *deposits* that may be found in the lungs after death are not the result of inhalation, but are either due to change of structure, produced by disease, or to chemical deposit, as previously suggested.

It is not, however, only particles of a hard nature, or of a high specific gravity, that cause injury to the delicate tissues of which the respiratory organs are composed; soft and light woolly matter, which floats in the air, is found to have a highly-injurious effect, when inhaled into the bronchial tubes and lungs.

(*To be continued.*)